ECOLOGICAL SURVEY OF THE PROPOSED CHURCH DOME RESEARCH NATURAL AREA CANNELL MEADOW RANGER DISTRICT, SEQUOIA NATIONAL FOREST, CALIFORNIA

(PURCHASE ORDER 43-9AD6-8-02627)

INTRODUCTION

The Church Dome candidate Research Natural Area (CDRNA) lies within the Cannell Meadow Ranger District, Sequoia National Forest. The area was selected and nominated by the Sequoia N.F. as a candidate RNA in 1986 to preserve an example of the Jeffrey pine (*Pinus jeffreyi*) target element in the Southern Sierra physiographic province of the California Region.

The CDRNA covers 1465 acres (593 ha) . The approximate center of the RNA is at Latitude 35° 52' N, Longitude 118° 15' W (see maps 1 and 2). The RNA falls within portions of sections 1, 2, 11, and 12 T24S, R34E and sections 6 and 7 T24S, R35E MDBM. Elevations range from ca. 6640 (2024 m) along the lower reaches of the south branch of Manter Creek to 8515 ft. (2595 m) atop Church Dome.

Access (reference map 1):

The CDRNA is accessible via the road up the Kern River Canyon above Lake Isabella. From Kernville take the paved county road SM99 north to Forest Road 22S05. Take the paved 22S05 east to Forest Road 22S12. Take the oiled 22S12 south past Big and Long meadows to Forest Road 24S14. Take the dirt road 24S14 east to the trailhead (34E08), about 1/2 mile (0.8 km) west of Church Dome and the Domeland Wilderness boundary. Total mileage from Kernville (Cannell Meadow R.D.) to the trailhead is ca. 52 (84 km). Total travel time for this distance is approximately two hours.

The trail 34E08 traverses the western side of the RNA on its way to Manter Meadow. Terrain to the east of the trail is generally moderately to gently sloping, and is easily traversed. Terrain to the west of the trail is steeper and difficult to negotiate, ascending to the precipitous rock walls of Church Dome.

PRINCIPAL DISTINGUISHING FEATURES

The CDRNA is underlain primarily by granitic basement rocks. However, a small area along the southeastern boundary is Pleistocene basalt flow. This forms the top and sides of Black Mountain. The CDRNA occupies a part of the southeast-flowing Manter Creek drainage. This broad basin (up to 4 miles or 6.4 km wide) is rimmed on the NW by the Sirretta Peak highlands, and the S

by Church Dome. The RNA contains a large portion of the southern Manter Creek weatershed. This is separated by a low, gently-sloping divide from the main branch to the north. Manter Creek empties into the Little Kern River. The highest slopes are shear granite cliffs. Below the spires of Church Dome and above 7600 ft. (2317 m) the area is steep and northeast-facing.

All streams within the CDRNA are ephemeral, drying typically by early summer. One perennial spring occurs near the N boundary. The steep NE-facing slopes above 7600 ft. (2317 m) and below the outcrops of Church Dome are vegetated with a mixed Jeffrey pine-white fir (*Abies concolor*) forest (photo 1). The western slopes of Black Mountain along the eastern boundary is covered with single-leaf pinyon pine (*Pinus monophylla*) forest. The remainder of the area (ca. 80%) is covered with an open forest of Jeffrey pine.

JUSTIFICATIONS FOR ESTABLISHMENT OF AREA

Jeffrey Pine Forest.

The Jeffrey pine forest of the CDRNA is varied, ranging from mature multi-age tall forests on deep soil of gently-sloping flats and terraces (photo 2) to young even-age forest on steep slopes. The forest may be dense as along stream courses, to very open on shallow rocky soil on S exposures. The Jeffrey pine forest on basalt atop Black Mountain has a substantially different understory than that on granitic substrate elsewhere in the RNA.

Jeffrey pine is a common tree of the upper elevation montane forests of California. Its tolerance of cold climate, poor (including ultramafic) soil, and relatively low precipitation usually places it in harsher environments than the similar ponderosa pine (*Pinus ponderosa*). The Jeffrey pine forests on the E slope of the Sierra Nevada include the largest pure stands in the world. An example of this forest for the central Sierra-Great Basin ecotone is protected in the Indiana Summit RNA (Taylor 1980). However, the CDRNA is the only one selected to represent this target for the southern Sierra Province. There are several differences between Indiana Summit and Church Dome, which demonstrate the ecological amplitude of the Jeffrey pine forest type. These are summarized in the following table.

Table 1: Comparative characteristics of Church Dome cRNA and Indiana Summit RNA.

	Indiana	Church
substrate:	deep volcanic ash, tuff	granitics, some basalt
precipitation:	12-16"	20-25" (more in summer)
low elev. bordering ecosystems:	Great Basin	Mojave Desert/California foothill
aspect and topography:	generally S and gradual	varied

These ecological differences are reflected in the associated flora of the two areas. In general, the CDRNA has a more distinctive cismontane California flora with an infusion of southern Sierra and southern California endemics, while the Indiana Summit flora is more clearly Great Basin in origin with few elements from the south.

The range of habitats is relatively greater at CDRNA than at Indiana Summit as a result of greater relief and slope direction. Thus, at low elevations the Mojave Desert and California woodland elements intermingle with the Jeffrey pine vegetation, while at upper elevations other typical Sierran montane elements such as white fir and sugar pine (*Pinus lambertiana*) are present.

Biogeographic Significance:

The CDRNA is situated at the far S end of the Sierra Nevada and borders the Mojave Desert and foothills of cismontane California. By virtue of its location, a number of floristic elements meet and intermingle within its boundaries. Several species are endemic to the Southern Sierra Nevada. These include several common and conspicuous members of the CDRNA flora such as : *Ceanothus pinetorum, Gilia leptantha* ssp. *purpusii, Frasera tubulosa, Orochaenactis thysanocarpha, Cordylanthus ferrisianus, Ivesia campestris,* and *Linanthus oblanceolatus* .

A number of other typical Sierran montane species are at or near their southern limits. These include: *Chaenactis douglasii* var. *rubricaulis,*

Heuchera rubescens var. *alpicola*, *Monardella odoratissima* ssp. *parviflora*, *Silene bridgesii*, *Cynoglossum occidentale*, *Stipa pinetorum*, *Oreonana clementis*, *Arnica mollis*, *Erigeron peregrinis* ssp. *callianthemus*, and *Lupinus grayi*.

Another group of species are typical of southern California and indicate the southern affinities of the flora of CDRNA. These include: *Calystegia longipes*, *Lupinus breweri* var. *grandiflorus*, *Eriogonum parishii*, *Penstemon caesius*, *Chaenactis santolinoides*, *Wyethis ovata*, *Madia elegans* ssp. *wheeleri*, and *Collinsia callosa*.

Several species are typical desert plants which are present in the lower elevations of the RNA. These include: *Ceanothus greggii* var. *vestitas*, *Lupinus excubitus*, *Keckiella rothrockii*, *Eriastrum sparsiflorum*, *E. wilcoxii*, and *Nolina wolfii* (photo 3).

PHYSICAL AND CLIMATIC CONDITIONS

The CDRNA lies along the far southern end of the Sierra Nevada with Church Dome the southernmost peak at or above 8500 ft. (2591 m) in the range. The area is at the southern end of the Kern Plateau, drained by the Little Kern River, which joins the Kern River and flows westward to the Buena Vista Basin west of Bakersfield. The southwestern arm of the Sierra Nevada west of the Kern River Canyon removes the area from the cismontane influence by creating a rain shadow. The vicinity of Tobias Pk 18 miles (29 km) west of Church Dome across the Kern River Canyon receives over 40" (1016 mm) precipitation annually, while at the same elevations, the RNA is likely to get between 20 and 25" (508-635 mm)/year (Rantz 1972). This rain shadow effect is augmented by the relative proximity to the northern Mojave Desert as indicated by the presence of typical high desert species such as single-leaf pinyon pine and *Nolina wolfii*.

Temperatures are relatively mild. Highs of between 80 and 85° F (26.6-29.4° C) were recorded during the three-day study period (late July). During two of these days afternoon thundershowers dropped light amounts of rain on portions of the RNA. Average winter lows are probably in the neighborhood of 20-25°F (-6.6 to -3.9° C). Snowfall is relatively light, A discontinued snowcourse at 7500 ft. (2286 m) at Cannell Meadows ca. 5 miles (8 km) SW of the RNA averaged 7.3" of water (equivalent from melted snow) on April 1. Kahrl (1979) indicates average April 1 snow depths

between 10 and 25" (25.4-63.5 cm) for the RNA.

VEGETATION, FLORA, AND OTHER VALUES

The flora of the CDRNA is relatively rich given its xeric aspect with at least 164 species collected in the area (see Appendix 1). None of these species is currently listed by the Forest, the State, or the California Native Plant Society (Smith and Berg 1988) as rare or threatened.

Vegetation Types:

The vegetation map (map 3) is organized using the system of Holland (1986) with Kuchler (1966) and SAF (Eyre 1980) equivalents indicated. Following is an account of the major plant associations occurring in the RNA. All scientific names are in accordance with Munz (1968), and code numbers following the association names are Holland type numbers. The associations are listed in decreasing order of size. For acreage and SAF and Holland equivalents see map 3.

Table 2: Area by Cover Types (with code numbers).

	% total	acres	hectares
HOLLAND TYPES (Holland 1986)			
Freshwater Seep (45400)	0.2	3	1.2
Great Basin Pinyon Woodland (72122)	3.6	52	21.0
Jeffrey Pine Forest (85100)	79.2	1160	469.4
Jeffrey Pine-Fir Forest (85210)	13.9	204	82.6
Alpine Talus and Scree (91200)	3.1	46	18.6
unclassified	0	0	0
Total	100.0	1465	592.8
SAF TYPES (Eyre 1980)			
White Fir (211)	13.9	204	82.6
Pinyon-Juniper (239)	3.6	52	21.0
Jeffrey Pine (247)	79.2	1160	469.4
unclassified	3.3	49	19.8
Total	100.0	1465	592.8

Table 2 (continued):

KUCHLER TYPES (Kuchler 1966)			
Mixed Conifer Forest (K-5)	93.1	1364	552.0
Juniper-Pinyon Woodland (K-21)	3.6	52	21.0
unclassified	3.3	49	19.8
Total	100.0	1465	592.8

Jeffrey Pine Forest (85100): This association covers the majority of the area below ca. 7600 ft. (2317 m) elevation. The canopy is essentially pure Jeffrey pine with very few other trees. Typically the forest is open with scattered shrubs of montane chaparral species such as *Arctostaphylos patula* and *Ceanothus pinetorum* intermixed with a lighter covering of Great Basin desert species such as *Purshia tridentata, Tetradymia canesecens Chrysothamnus nauseosus* ssp. *albicalulis,* and *C. viscidiflorus*. Total vegetative ground cover averages around 25%. However, this is variable with some areas averaging cover of up to 50% (mostly *Arctostaphylos patula*, photo 4) and some areas of deep decomposed granite soil averaging virtually no vegetative cover, photo 5). The average stature of the dominant pines over most of the area is not great (ca. 80 ft. tall and 30" dbh, but up to 110 ft. tall and 54" dbh). Soils over the majority of the forest are shallow, overlying granitic bedrock. Sapling and seedling recruitment is strongly dependant on moisture, with the deepest stream bottom soils supporting the highest density of juvenile individuals.

The structure and history of the forest is variable. At highest elevations along the ecotone with the Jeffrey pine-fir forest, there are small even-aged stands of young trees. These average ca. 90 years and are likely to be the result of a crown fire about 100 years ago. The majority of the Jeffrey pine forest is suffciently open to limit the spread of crown fire. Numerous small fire scars exist on mature trees in the mid-elevation main part of the forest, suggesting the regular occurrence of ground fires. The most recent fire in the Jeffrey pine forest at Church Dome was ca. 50 years ago. This was principally a ground fire in the NW corner of the area where it singed the trunks of relatively small trees without killing them. In one area it apparently rejuvenated a small stand of mountain chaparral dominated by *Arctostaphylos patula*.

A transect was run diagonally across the mid-elevation Jeffrey pine

forest. This transect was approximately 1 km long. Along it 15 400 m^2 quadrats were sampled. The density, frequency and basal area of all trees over 2 m tall were tallied. All saplings and seedlings were identified and counted on the quadrats, and the frequency and cover of all shrubby and herbaceous species were also noted. The results of this sampling is summarized in tables 3 and 4.

Table 3: Summary of vegetation sampling for trees (>2m) on 15 400 m^2 plots (6000 m^2) in Jeffrey pine forest at Church Dome candidate RNA.

species	den. (per sq. m)	freq.	cover (sq. m)	rel.den.	rel.freq.	rel.cov.	Imp. Value
Jeff.Pine	0.0203	1.000	13.41	0.879	0.750	0.890	251.9
Cany. oak	0.0023	0.133	0.75	0.100	0.100	0.049	24.9
W.Juniper	0.0003	0.133	0.91	0.13	0.100	0.061	17.4
White fir	0.0002	0.067	0.01	0.009	0.050	0.001	6.0
totals	0.0231	1.333	15.08	1.001	1.000	1.001	300.2

Table 4: Herb and shrub cover and frequency on 15 400 m^2 quadrats in Jeffrey Pine forest at Church Dome Candidate RNA.

species	frequency	x % cover
shrubs:		
Arctostaphylos patula	0.87	11.30
Purshia tridentata	0.40	9.80
Ceanothus pinetorum	0.67	3.70
Chrysothamnus nauseosus	0.47	0.87
Tetradymia canescens	0.40	0.40
Ceanothus cordulatus	0.07	0.30
Rhamnus californicus	0.07	0.07
Chrysothamnus viscidiflorus	0.07	-
Haplopappus cuneatus	0.07	-
Holodiscus microphyllus	0.07	-
Prunus emarginatus	0.07	-
herbs:		
Eriogonum umbellatum	0.20	0.47

Table 4 (continued):

species	frequency	x % cover
Lupinus breweri	0.20	0.33
Cryptantha sp.	0.20	0.13
Eriogonum wrightii	0.40	0.07
Orochaenactis thysanoides	0.33	0.07
Poa incurva	0.13	0.07
Sitanion hystrix	0.33	0.07
Wyethia ovata	0.20	0.07
Gilia leptantha ssp. *purpusii*	0.53	-
Gayophytum diffusum	0.47	-
Erigeron breweri	0.40	-
Eriogonum nudum	0.40	-
Stipa latiglumis	0.33	-
Corethrogyne filaginifolia	0.20	-
Eriophyllum confertiflorum	0.26	-
Stipa elmeri	0.26	-
Chaenactis douglasii	0.13	-
Cordylanthus ferrisianus	0.13	-
Eriastrum sparsiflora	0.13	-
Linanthus sp.	0.13	-
Lupinus andersonii	0.13	-
Monardella odoratissima parvifolia	0.13	-
Pedicularis semibarbata	0.13	-
Penstemon caesius	0.13	-
Angelica lineariloba	0.07	-
Arabis platysperma	0.07	-
Asclepias cordifolia	0.07	-
Castilleja applegatei	0.07	-
Collinsia callosa	0.07	-
Eriogonum saxitile	0.07	-
Festuca mgalura	0.07	-
Frasera tuberosa	0.07	-
Graminae sp.	0.07	-
Hulsea vestita	0.07	-
Ipomopsis aggregata	0.07	-
Lupinus excubitus	0.07	-
Oreonana clementis	0.07	-
Penstemon newberryi	0.07	-
Scutellaria sp.	0.07	-

Sapling (>6",<72" tall) and seedling (<6" tall) densities on the sample are low with an average of 92 saplings/ha, 95% of which are Jeffrey pine. There is an average of only 5 seedlings/ha, all Jeffrey pine.

Not included in the sample are occasional scraggly multi-stemmed individuals of California black oak (*Quercus kelloggii*). These occur in a relatively narrow belt at the upper elevations of the Jeffrey pine forest typically on open exposed sites. Also at the upper elevations near the ecotone with the white fir-Jeffrey pine forest are occasional individuals of incense-cedar (*Calocedrus decurrens*).

The small Jeffrey pine forest atop Black Mountain is more of a mixed forest than the sampled area, with some canyon live oak, single-leaf pinyon, white fir, and western juniper (*Juniperus occidentalis* ssp. *australis*). The understory vegetation is dominated by *Chrysothamnus viscidiflorus, Lupinus andersonii, Ceanothus greggii* var. *vestitas, Cordylanthus ferrisianus, Eriogonum umbellatum, Castilleja applegatei,* and *Eriogonum wrightii.*

Growth rates of Jeffrey pine vary depending on soil depth, exposure, and moisture relations. Several trees were aged within the RNA. These were sampled primarily in relatively deep Chaix-Chanwanakee-type soils. The following table gives the age, diameter, slope exposure and distance from base for the sampled trees.

Table 5: Jeffrey pine ages for 10 trees in the NW portion of the RNA.

age	diameter at core (inches)	height from base (inches)	slope exposure
125	30	18	NE
235	37	18	NE
115	26	15	NE
137	28	16	NE
123	23	14	NE
152	34	15	SE
116	23	15	SE
122	33	10	bottomland
127	37	15	bottomland
142	41	12	bottomland

In general, the slowest-growing trees are on shallow rocky soils with southerly exposures.

Jeffrey Pine-White Fir Forest (85210): This is the upper elevation forest of northeasterly slopes. It is co-dominated by Jeffrey pine and white fir with some sugar pine (*Pinus lambertiana*). There is a trend toward white fir dominance at the highest elevations (e.g., along the base of the granitic escarpments of Church Dome), and a cline from lower elevation Jeffrey pine forest up to this association.

Eleven 400 m^2 plots were sampled along a transect which crossed the NE facing slopes at ca. 7800 ft. (2377 m). The results of the sampling for trees and shrubs and herbs are shown in tables 6 and 7.

Table 6: Summary of vegetation sampling for trees > 2 m on 11 400 m^2 plots (4400 m^2) in white fir-Jeffrey pine forest at Church Dome RNA.

species	den. (per sq. m)	freq.	cover (sq. m)	rel.den.	rel.freq.	rel.cov.	Imp. Value
Jeff.pine	0.014	0.909	8.63	0.452	0.417	0.495	136.4
white fir	0.016	1.000	7.09	0.516	0.458	0.407	138.1
sugar pine	0.001	0.273	1.71	0.032	0.125	0.098	25.5
totals:	0.031	2.182	17.43	1.000	1.000	1.000	300.0

Table 7. Herb and shrub cover and frequency on 11 400 m^2 quadrats in white fir-Jeffrey pine forest at Church Dome RNA.

species	frequency	% cover
shrubs:		
Keckiella rothrockii	0.91	0.82
Tetradymia canescens	0.36	0.18
Chrysolepis sempervirens	1.00	14.82
Chrysothamnus nauseosus	0.91	0.55
Arctostaphylos patula	0.18	0.64
Galium munzii	0.45	-
Holodiscus microphyllus	0.09	-
Ceanothus pinetorum	0.09	-
Ceanothus cordulatus	0.09	-
herbs:		
Arabis platysperma	0.91	-
Penstemon caesius	0.64	-
Leptodactylon pungens	0.46	-
Pyrola picta integra	0.46	-
Hieracium horridum	0.27	-
Eriogonum nudum	0.27	-
Phoradendron abietum??	0.18	-
Stipa latiglumis	0.18	0.09
Castilleja applegatei	0.09	-
Cordylanthus ferrisianus	0.09	-
Eriogonum umbellatum	0.09	-
Eriophyllum confertiflorum	0.09	-
Erysimum capitatum	0.09	-
Gayophytum diffusum	0.09	-
Ivesia santolinoides	0.09	-
Lupinus breweri	0.09	-
Monardella odoratissima parvifolia	0.09	-

Compared to the Jeffrey pine forest this association has a higher density of trees (310 vs. 231 trees/ha) and a higher basal area cover (39.6 vs 25.1 m^2/ha). The trees are somewhat larger in stature than those of the Jeffrey pine forest with average canopy heights of 90-110 ft. (27-34 m) and typical dominants ranging from 35-40" (89-102 cm) dbh.

Sapling and seedling density is also higher than in Jeffrey pine forest. Total sapling density is 250/ha with 72% being white fir, 24% Jeffrey pine, and 4% sugar pine. Total sapling density in Jeffrey pine forest is only 92/ha. Total seedling density in the white fir-Jeffrey pine forest is 40/ha (the proportions are: 50% white fir, 25% Jeffrey pine, and 25% sugar pine), eight times the density of seedlings in Jeffrey pine forest.

The understory of the white fir-Jeffrey pine forest has a somewhat lower average cover than the Jeffrey pine forest (17% vs. 25%) and is dominated by bush chinquapin (*Chrysolepis sempervirens*). This species is a good indicator of this association at CDRNA; it is seldom found elsewhere locally. Other shrub species such as *Keckiella rothrockii* and *Galium munzii* are also largely restricted to this association in the RNA. Herbs are fewer in species than in the Jeffrey pine forest and are dominated by *Arabis platysperma, Penstemon caesius, Leptodactylon pungens,* and *Pyrola picta* ssp. *integra*.

Great Basin Pinyon Woodland (72122): This association is limited to the western slopes and northern summit area of Black Mountain (photo 6). It occurs primarily on basaltic flows or colluvium. It is dominated by low trees (ca. 7-11 m tall) of single-leaf pinyon pine and is bordered by Jeffrey pine forest on less steep and less rocky slopes. and by curl-leaf mountain mahogany (*Cercocarpus ledifolius*) scrub on steeper, rockier slopes (outside of the RNA).

Ten 100 m^2 plots were sampled in this association on the NW slope of Black Mountain. The plots were spaced approximately 50 m apart on a transect running downslope. Tables 8 and 9 summarize the data from these plots.

Table 8: Summary of vegetation sampling for trees on 10 100 m^2 quadrats in single-leaf pinyon forest at Church Dome RNA.

species	den. (per sq. m)	freq.	cover (sq. m)	rel.den.	rel.freq.	rel.cov.	Imp. Value
pinyon p.	0.071	1.00	1.97	0.683	0.455	0.467	160.5
Jeffrey p.	0.013	0.60	2.03	0.125	0.273	0.482	88.0
canyon oak	0.016	0.50	0.21	0.154	0.227	0.049	43.0
Mt. mahog.	0.004	0.10	0.01	0.039	0.460	0.002	8.7
totals.	0.104	2.20	4.22	1.001	1.001	1.000	300.2

Table 9: Frequency and mean percent cover of shrubs and herbs on 10 100 m^2 quadrats in single-leaf pinyon pine forest at Church Dome RNA.

species	frequency	x % cover
shrubs:		
Purshia tridentata	0.40	1.4
Artemisia tridentata	0.40	1.2
Ribes cereum	0.10	0.2
Tetradymia canescens	0.10	0.1
Cercocarpus ledifolius	0.40	0.4
Arctostaphylos patula	0.2	0.9
Ceanothus cuneatus	0.1	0.2
Cercocarpus betuloides	0.1	-
herbs:		
Erigeron breweri	0.6	0.7
Sitanion hystrix	0.6	0.7
Poa fendleriana	0.1	0.7
Lupinus excubitus	0.3	0.6
Stipa latiglumis	0.3	0.5
Monardella odoratissima parvifolia	0.5	0.5
Eriogonum umbellatum	0.7	0.4
Poa incurva	0.5	0.3
Melica stricta	0.2	0.3

Table 9 (continued):

species	frequency	$\bar{x}$ % cover
Eriogonum wrightii	0.1	0.2
Collinsia sp.	0.6	-
Cryptantha echinella	0.6	-
Gilia leptantha purpusii	0.3	-
Bromus laevipes	0.2	-
Bromus tectorum	0.1	-
Castilleja applegatei	0.1	-
Gayophytum diffusum	0.1	-
Linanthus sp.	0.1	-
Silene sp.	0.1	-
Stipa elmeri	0.1	-

Compared to the other two forest types in the RNA this association has the highest density (1040 trees/ha) and basal area cover (42.2 m^2/ha). Although single-leaf pinyon pine is the dominant, canyon live oak and Jeffrey pine are constant associates. Just outside of the eastern boundary a stand of curl-leaf mountain mahogany borders on this association. This species is occasional throughout the main body of the association.

The understory vegetation is typically sparse (mean cover 9%), probably largely as a result of the denser shade and heavier duff accumulations within this association compared to others in the RNA. The two most common shrubs; *Artemisia tridentata* and *Purshia tridentata* are common associates of pinyon pine forest throughout much of transmontane California. In some areas of this forest dead and senescent shrubs of *Arctostaphylos patula* suggest a past fire that may have destroyed much of the pinyon canopy about 100 years ago. Most pinyon appear relatively young (under 100 years).

Freshwater Seeep (45400): This association is limited to the perenially moist spring in the northern part of the RNA. The spring is a low volume type with a human-modified head (see impacts) and a wet tail running about 50 m downslope (photo 7). This habitat is also approximated along parts of the branches of south Manter Creek within the RNA. At these

locales, although surface water is absent after early summer, enough moisture exists to support a more limited version of the spring and seep vegetation. A large number of species are associated with this spring and streambeds in the area. These include; *Arnica mollis, Artemisia ludoviciana, Madia elegans* ssp. *wheeleri, Lilium parvum, Muhlenbergia richardsonis, Nasturtium officinale, Mimulus guttatus, Erigeron peregrinus* ssp. *calianthemus, Epilobium brevistylum, Taraxacum officinale, Boisduvalia densiflora, Veronica serpyllifolia* var. *humifusa, Ivesia campestris, Stachys albens, Mimulus moschatus, Juncus mexicanus, Rosa californica, Juncus macrandrus, Deschampsia elongata, D. caespitosa, Danthonia californica var. americana, Carex nebrascensis, C hassei, C. fracta, C. teneraeformis, Salix scouleriana, S.* sp., *Sidalcea oregana* ssp. *spicata* , *Trifolium wormskioldii, T. microcephalum, Luzula comosa,* and *L. parviflora* .

Alpine Talus and Scree (91200): Although not technically alpine, the cliffs and colluvial deposits about Church Dome house a small number of montane species which are typical of high-elevation rocky situations (photos 8, 9, and 10). This association may be divided into xeric and mesic subtypes. Most diverse is the mesic subtype, which occupies crevices on the northeast-facing slopes of the dome. These include *Potentilla saxosa* ssp. *sierrae, Heuchera rubescens* var. *alpicola, Senecio fremontii* var. *occidentalis, Silene bridgesii,* and *Stipa pinetorum* , . The xeric subtype includes *Penstemon newberryi, Zauschneria latifolia, Eriogonum saxitile,* and *Haplopappus cuneatus*. In addition to occurring on Church Dome it also occurs on lower elevation outcrops, such as the large dome along the east-central border of the area.

Fauna:

Appendix 2 lists all vertebrates noted during the ecological survey. This includes about 53 species. One species, the goshawk, is considered sensitive by the Sequoia N.F. The presence of several typically lower elevation species such as wren-tit, bushtit, scrub jay, and sage sparrow underscores the area's affinity to desert and lowland cismontane habitats.

Geology:

The area is part of the Sierra Nevada Batholith, a huge area of Cretaceous granitic rocks covering the majority of the southern Sierra Nevada (Jennings

et al. 1977). These rocks within the RNA vary from exfoliating rounded domes and small rises at the lower elevations to the precipitous battlements and spectacular chasms and escarpments of Church Dome. In general, the granitics of the Church Dome outcrops are coarse-textured, with large porphyritic boulders and many phenochrysts of plagioclaise and quartz. The rock is often discolored by iron oxides (and other minerals?) and is more orangy-tan than the light colored, finer textured granitics of the low and mid-elevations in the RNA. As with most areas of granitic rock, jointing planes play an important role in shaping the topography. The parallel stream courses at the lower eastern side of the area is an example of the effect of erosion along jointing planes, as are numerous small cliffs and crevices throughout the area.

The basaltic flow capping Black Mountain is of Quaternary age (Jennings et al. 1977). The flat elongate summit area of the mountain corresponds to the resistant cap of lava which flowed to the north. This cap varies from about 50 m to 250 m wide and consists of dark, moderately vessicular basalt, which contrasts sharply with the surrounding light colored granitic rocks. The basalt flow (or flows) is (are) apparently about 50 m thick and erosion at the edges has produced colluvium which covers much of the western slopes of the mountain. Certain part of the flow have cooled in columnar form similar to the famous Devil's Postpile area of the Central Sierra.

Soils:

The order three soil survey of the Sequoia N.F. (1982) divides the soils of the CDRNA into four mapping units (see map 4).

The largest area, covering the middle elevations in the RNA, is mapped as Rock outcrop-Brader-Siskiyou families complex, 20-60% slopes. This unit is 60% rock outcrop, 20% Brader family, and 15% Siskiyou family soils. Included in this unit are small areas of Dome, Chaix, and Chawanakee soils. Rock outcrop occurs as isolated or massive exposures of granitic rock. Runoff is very rapid, concentrating large quantities of water downslope, which increases the erosion hazard. The Brader family soil is shallow and somewhat excessively drained. It is derived from decomposed granitic rock. Typically, the surface layer is brown gravelly coarse sandy loam about 6" (15 cm) thick. The subsoil is light yellowish brown gravelly sandy loam about 10" (25 cm) thick over highly weathered granitic rock. The Siskiyou family soil is moderately deep and well-drained to somewhat excessively drained. It is also formed from decomposed granitic rock. The surface layer is brown, ca. 5" (13 cm) deep. The subsoil is brown gravelly sandy loam

about 18" (45 cm) thick. The substratum is brown gravelly coarse sandy loam about 5" (13 cm) thick over highly weathered granitic rock.

A large area of Chaix-Chawanakee-Rock outcrop complex, 5-30% slopes occurs on relatively gentle slopes in the northwestern part of the RNA. This unit is about 55% Chaix, 25% Chawanakee, and 10% Rock outcrop. Included in this unit are small areas (10% total) of Dome and Holland soils. The Chaix soil is moderately deep and is well-drained to somewhat excessively drained. It is derived from decomposed granitic rock. Typically the surface layer is brown sandy loam about 7" (18 cm) deep. The subsoil is pale brown sandy loam about 19" (47 cm) thick over highly weathered granitic rock. In some areas the surface layer is coarse sandy loam. The Chawanakee soil is shallow and somewhat excessively drained. It is derived from decomposed granite. Typically the surface layer is grayish-brown coarse sandy loam about 3" (7 cm) thick. The subsoil is yellowish brown sandy loam about 7" (18 cm) thick over highly weathered granitic rock. In some areas the surface layer is sandy loam. The Rock outcrop component has been previously described. This soil unit has the largest Jeffrey pines, and probably the fastest growth rates within the Jeffrey Pine forest.

The next most extensive unit in the CDRNA is rock outcrop. This consists of small to very large outcrops of granitic rocks. It is previously described.

The final unit occurring in the RNA is the Rock outcrop-Xerothents association, steep. This occupies the top and slopes of Black Mountain. Slope is 30-50%. The unit is 65% Rock outcrop and 35% Xerothents. In this case rock outcrop occurs as isolated and massive exposures of basic igneous rocks (basaltic lavas locally). Xerothents form in unconsolidated recent colluvium (as along the sides of the mountain). They vary in their texture and percentage of rock fragments. The Xerothents do not have distinct soil horizons.

Cultural Values:

The CDRNA was part of the territory of the Tubatulabal group. The name means "pine-nut eaters" (Smith 1978). As the primary staple crops of these people were acorns (mostly from the lower Kern River valleys) and pinyon nuts (mostly from the eastern slopes of the Sierra), there is little likelyhood of the RNA being used more than sporadically as a hunting ground during the warmer months.

IMPACTS

Recreation:

Despite the inclusion entirely within the long-established Domeland Wilderness, the CDRNA receives little recreational impact. The trail through the western portion of the area has light use. During my four day stay in the area I saw no cars at the trail head and no one on the trail. The remainder of the area is very lightly used. The only evidence of former visitation was an old triangulation point atop Black Mountain and a small cement cap placed at the head of the spring which had a date of 1931. The spring itself had a small plastic cup floating in it and the head had been scooped-out and dammed with decomposed granite to provide a basin for dipping water. It is likely that Church Dome is occasionally scaled by climbers.

Grazing:

There was no evidence of cattle throughout the majority of the RNA. Along the northern border (including the area around the spring) there was some evidence of past use (old cow pies, a salt lick), but no indication of habitat alteration either at the spring or elsewhere. There is a large herd of cattle at Manter Meadow (less than 1 km from the northern boundary) during the summer. However, these animals are contained by drift fences. The majority of the area is not valuable forage land and would not be attractive to cattle.

VEGETATION MANAGEMENT CONCERNS

The majority of the area shows little deviation from the presumed pristine condition of the vegetation. Fire suppression practices have not strongly affected the area. Since most of the forests are open, with little litter and overly dense stands of young trees and saplings, there is no need to prepare a detailed prescription for controlled burning. As the entire area is within the Domeland Wilderness, the minimal wilderness fire suppression techniques will be appropriate for this RNA.

BOUNDARIES

In general the original boundaries proposed by the Sequoia N.F. in 1986 are well suited to the preservation of the ecological integrity of the area. I have modified the northwestern portion of the area from the original

proposal by enlarging it to run along the low divide between the drainage within the RNA and the Manter Meadow watershed. This was done to include more acreage of the well developed Jeffrey pine forest on Chaix soils in that area. Despite the proximity to Manter Meadow, there is no evidence of increased impact from cattle or humans in that area.

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APPENDIX 1
Vascular Plant List

This list is limited to those species identified during the ecological survey of the area from July 22 to 26, 1988. Taxonomy follows Munz (1968). During this period 164 taxa were identified from the area. The symbols following the plant names indicate the following habitats:

jp.....Jeffrey pine forest
jp-wf.....Jeffrey pine-white fir forest
pp.....Pinyon pine forest
ss.....Streambed and spring association
t-s.....Talus and scree association

Abies concolor ; major component wf-jp, occasional jp
Achillea millefolium ; ss (streambed)
Agropyron trachycaulum ; ss (streambed)
Agrostis exarata ; ss (spring)
Amelanchier pallida ; ss (streambed), adjacent jp (mesic)
Angelica lineariloba ; ss (moist streambeds)
Antennaria dimorpha ; pp, atop Black Mtn. and open jp N border
Apocynum pumilum ; occasional jp-wf, upper jp
Arabis holboelii var. *retrofracta* ; occasional jp
Arabis platysperma ; common jp-wf
Arceuthobium campylopodium ; on Jeffrey pine throughout
Arctostaphylos patula ; jp, jp-wf common, occasional pp
Arnica mollis ; ss at spring only
Artemisia arbuscula ssp. *nova* ; open pp atop Black Mtn.
Artemisia douglasiana ; ss (streambed)
Artemisia ludoviciana ; ss near spring
Artemisia tridentata ; pp, occasional jp
Asclepias cordifolia ; occasional open jp
Boisduvalia densiflora ; ss (moist streambed)
Bromus ciliatus ; ss (streambed)
Bromus laevipes ; jp Black Mtn, rare elsewhere in jp
Bromus rubens ; xeric low elev. t-s
Bromus susksdorfii ; jp atop Black Mtn
Bromus tectorum ; pp, open jp occasional
Calocedrus decurrens ; jp, jp-wf
Calystegia longipes ; pp

Carex fracta ; ss (spring)
Carex hassei ; ss (spring)
Carex nebrascensis ; ss (spring)
Carex teneraformis ; ss (spring and moist streambed)
Castilleja applegatei ; occasional jp, pp
Ceanothus cordulatus ; jp, jp-wf
Ceanothus pinetorum ; common jp, jp-wf
Cercocarpus betuloides ; low elevation pp uncommon
Cercocarpus ledifolius ; pp (Black Mtn.)
Chaenactis douglasii var. *rubricaulis* ; jp occasional
Chaenactis santolinoides ; jp occasional
Chrysolepis sempervirens ; jp-wf common
Chrysothamnus nauseosus ssp.? ; jp, pp
Chrysothamnus viscidiflorus ; jp (common Black Mtn, occas. elsew)
Chrysothamnus viscidiflorus ssp. *puberulus* ; occas. jp
Cirsium coulteri ; pp, jp
Collinsia callosa ; pp, ss (streambed)
Cordylanthus ferrisianus ; common on xeric exposures up to 7800 ft.
Corethrogyne filaginifolia var. *brevicula* ; t-s (xeric), open jp
Cryptantha echinella ; fairly common in jp
Cynoglossum occidentale ; occasional jp-wf, jp
Cystopteris fragilis ; ss (streambed)
Danthonia californica var. *americana* ; ss (streambed)
Deschampsia caespitosa ; ss (spring)
Deschampsia elongata ; ss (streambed)
Epilobium brevistylum ; occas ss (both spring and drying streambeds)
Eriastrum sparsiflorum ; pp, jp
Eriastrum wilcoxii ; occasional in jp
Erigeron breweri var. *breweri* ; common pp, jp
Erigeron peregrinus ssp. *callianthemus* ; ss at spring
Eriogonum nudum ; jp, pp, jp-wf
Eriogonum parishii ; pp, jp
Eriogonum saxitile ; t-s, xeric low elevations
Eriogonum umbellatum var. *umbellatum* ; jp-wf, jp
Eriogonum wrightii var. *subscaposum* ; jp, jp-wf, pp
Eriophyllum confertifolium ; open jp, occasional jp-wf
Erysimum capitatum ; jp, jp-wf occasional
Festuca (Vulpia) megalura ; occasional open xeric jp
Frasera tubulosa ; open jp occasional throughout

Galium munzii ; jp-wf, t-s Church Dome
Galium trifidum ssp. *pusillum* ; ss (spring)
Gayophytum diffusum ssp. *parviflorum* ; common jp, pp, jp-wf
Gilia leptantha ssp. *purpusii* ; common pp, occas. jp
Haplopappus cuneatus ; t-s, (xeric)
Heuchera rubescens var. *alpicola* ; t-s (mesic)
Hieracium albiflorum ; occasional jp
Hieracium horridum ; occasional jp, more common jp-wf, t-s (xer)
Holodiscus microphyllus ; jp-wf, pp, jp, t-s occasional
Horkelia tridentata ; uncommon ss (streambed) near S limits
Hulsea vestita ; occas. deep decomposed granite open jp
Hypericum formosum ; ss (spring)
Ipomopsis aggregata ; occasional jp, jp-wf
Ivesia campestris ; ss (moist streambed)
Ivesia santolinoides ; jp-wf, jp
Juncus macrandrus ; ss (spring)
Juncus mexicanus ; ss spring and streambed
Juniperus occidentalis ssp. *australis* ; pp, jp
Keckiella breviflorus ; pp
Keckiella rothrockii ; jp-wf
Lepidium campestre ; rare trailside jp
Leptodactylon pungens ssp. *pulchriflorum* ; jp-wf, occasional jp
Lilium parvum ; ss at spring
Linanthus oblanceolatus ; open jp, below elevation listed in Munz
Lotus crassifolius ; jp
Lotus nevadensis ; open jp near N boundary
Lotus purshianus ; occasional jp
Lupinus andersonii ; jp (especially Black Mtn. summit)
Lupinus breweri var. *grandiflorus* ; jp, jp-wf
Lupinus excubitus var. *excubitus* ; pp, jp
Lupinus grayi ; pp, Black Mtn
Luzula comosa ; ss (spring)
Luzula parviflora ; ss (spring)
Luzula subcongesta ; ss (spring), S limits nearby
Machaeranthera canescens ; open jp on N side of area
Madia elegans ssp *wheeleri* ; ss drying creek bed
Melica imperfecta ; pp Black Mtn
Melica stricta ; occasional jp, pp
Mentzelia sp. uncommon pp
Mimulus moschatus ; ss along moist streambed

Mimulus whitneyi ; open decomposed granite jp, occas.
Monardella linioides ; open rocky jp low elevations
Monardella odoratissima ssp. *parvifolia* ; jp-wf
Muhlenbergia richardsonis ; common at edges of spring and stream along N boundary
Muhlenbergia filiformis ; ss (spring)
Nasturtum officinale ; ss, spring
Nolina wolfii ; xeric t-s low elevations (highest elev. for sp.?)
Opuntia basilaris ; occasional pp (Black Mtn)
Oreonana clementis ; deep decomposed granite in open jp (lower than listed in Munz)
Orochaenactis thysanocarpha ; common in jp
Pedicularis semibarbata ; jp-wf, jp
Penstemon bridgesi i; occasional jp-wf, pp
Penstemon caesius ; jp-wf, jp
Penstemon speciosus ; jp occcasional
Perideridia parishii ; ss (spring)
Phoradendron bolleanum var. *pauciflorum* ; on *Abies concolor* jp-wf
Pinus jeffreyi ; jp, pp, wf-jp
Pinus lambertiana ; jp-wf
Poa fendleriana ; pp Black Mtn., occasional elsewhere
Poa incurva ; pp Black Mtn.
Poa pratensis ; ss (spring)
Potentilla glandulosa ssp. *nevadensis* ; ss (streambed)
Potentilla saxosa ssp. *sierrae* ; t-s
Prunus emarginata ; occasional jp
Purshia tridentata ; pj, pp
Pyrola picta ssp. *integra* ; jp-wf fairly common
Quercus chrysolepis ; jp (low elev S slopes), pp
Quercus kelloggii ; jp mostly upper elevations
Rhamnus californicus ; uncommon open jp
Ribes cereum ; pp, jp occasional
Rosa californica ; ss (streambed)
Rumex salicifolius ; ss (moist streambed)
Sagina saginoides var. *hesperia* ; ss (streambed)
Salix ligulifolia ; ss along streamchannels
Salix scouleriana ; ss (streambed)
Sambucus caerulea ; uncommon jp
Sarcodes sanguinea ; occasional jp-wf, jp

Scutellaria austinae ; ss (streambed)
Senecio fremontii var. *occidentalis* ; t-s
Sidalcea oregana ssp. *spicata* ; ss at spring
Silene bridgesii ; jp-wf
Silene lemmonii ; pp, jp
Sitanion hystrix ; occasional jp, pp
Stachys albens ; ss (spring)
Stephanomeria tenuifolia ; occas. jp, S limits near here
Stipa elmeri ; pp, occas. jp
Stipa latiglumis ; occasional jp, pp
Stipa pinetorum ; t-s, Church Dome, may be S range limit
Stipa speciosa; pp lower slopes Black Mtn.
Symphoricarpos parishii ; jp, occasional
Taraxicum officinale ; ss (spring)
Tetradymia canescens ; jp, pp, jp-wf
Trifolium microcephalum ; ss (moist streambed)
Trifolium sp.; ss (streambed) dried annual sp.
Trifolium wormskioldii ; ss (streambed and spring)
Veronica serpyllifolia var. *humifusa* ; ss (spring)
Wyethia ovata ; occasional jp
Zauschneria latifolia ; t-s (xeric) open jp
Zigadenus veneosus ; ss (streambed)

APPENDIX 2
List of Vertebrates

This list is restricted to those species seen or their presence detected while conducting the field work for this report (July 22 through 26, 1988).

Reptiles:
Sagebrush lizard
Western rattlesnake

Birds:
Red-tailed hawk
Goshawk (one adult mobbed by kestrel over Black Mtn)
American kestrel
Mountain quail
White-throated swift
Rufous hummingbird
Pygmy owl
Poorwill
White-headed woodpecker
Hairy woodpecker
Common flicker
Dusky flycatcher
Western wood pewee: common throughout JP forest
Olive-sided flycatcher
Townsend's solitaire
Western bluebird
Violet-green swallow
White-breasted nuthatch
Wren-tit: (Black mountain w- slope up to 7700 ft.)
House wren; in manzanita
Rock wren (Church Dome)
Canyon wren (Church Dome)
Bewick's wren (pinyon and shrubs in Jeffrey pine forest)
Clark's nutcracker
Raven
Scrub jay (Pinyon pine forest)
Steller's Jay
Mountain chickadee
Bushtit (pinyon)
Pygmy nuthatch
Plain titmouse (pinyon woodland)

Solitary vireo
Orange-crowned warbler; at spring
Nashville warbler (upmountain wanderer)
Western tanager
Black-headed grosbeak (Black Mountain W-slope)
Cassin's finch
Rufous-sided towhee (up to 7800 ft.)
Dark-eyed junco
Chipping sparrow (NW side)
Sage sparrow (common post breeding wanderer)
Fox sparrow

Mammals:
Big-brown bat
Small bat (*Myotis* sp.)
Botta pocket gopher; workings common in deeper soils
Beechey ground squirrel (atop Black Mtn., and lower elevs. in open forest)
Douglas squirrel
Merriam chipmunk
Lodgepole chipmunk
Black bear (pinyon nuts in scat)
Coyote

PHOTO CAPTIONS

Photo 1: The upper NE-facing slopes at the base of Church Dome. The forest is co-dominated by Jeffrey pine and white fir. Manter Meadow is in the middle distance with the Sierreta Peak highlands in the far distance across the upper Manter Creek drainage.

Photo 2: Well-developed Jeffrey Pine forest on deep soils in the NW corner of the proposed RNA.

Photo 3: Very open Jeffrey pine forest with Nolian wolfii at lower elevations in the proposed RNA. Black Mountian is in the background, note dark basalt cap contrasting with the light granitic rock of the lower elevations.

Photo 4: Jeffrey pine forest on the lower slopes of Church Dome (on skyline) with a high density of Arctostaphylos patula in the understory.

Photo 5: Jeffrey pine forest with a large patch of deep decomposed granite with virtually no vegetative cover. Such decomposed granite soils are the home of small herbs such as *Oeronana clementis* and *Hulsea vestita*.

Photo 6: The open single-leaf pinyon pine forest atop the northern plateau of Black Mountain. Yellow-green herb in the foreground is *Cordylanthus ferrisianus*.

Photo 7: The spring in the NW 1/4 of section 1, the only source of permanent water in the proposed RNA.

Photo 8: One of the several spires of Church Dome, the crevices are home to species of the mesic subtype of talus and scree association.

Photo 9: *Potentilla saxosa* ssp. *sierrae*, a characteristic species of the talus and scree association.

Photo 10: *Senecio fremontii* var. *occidentalis*, an uncommon species of mesic crevices in the talsu and scree association on Church Dome.

Map 1

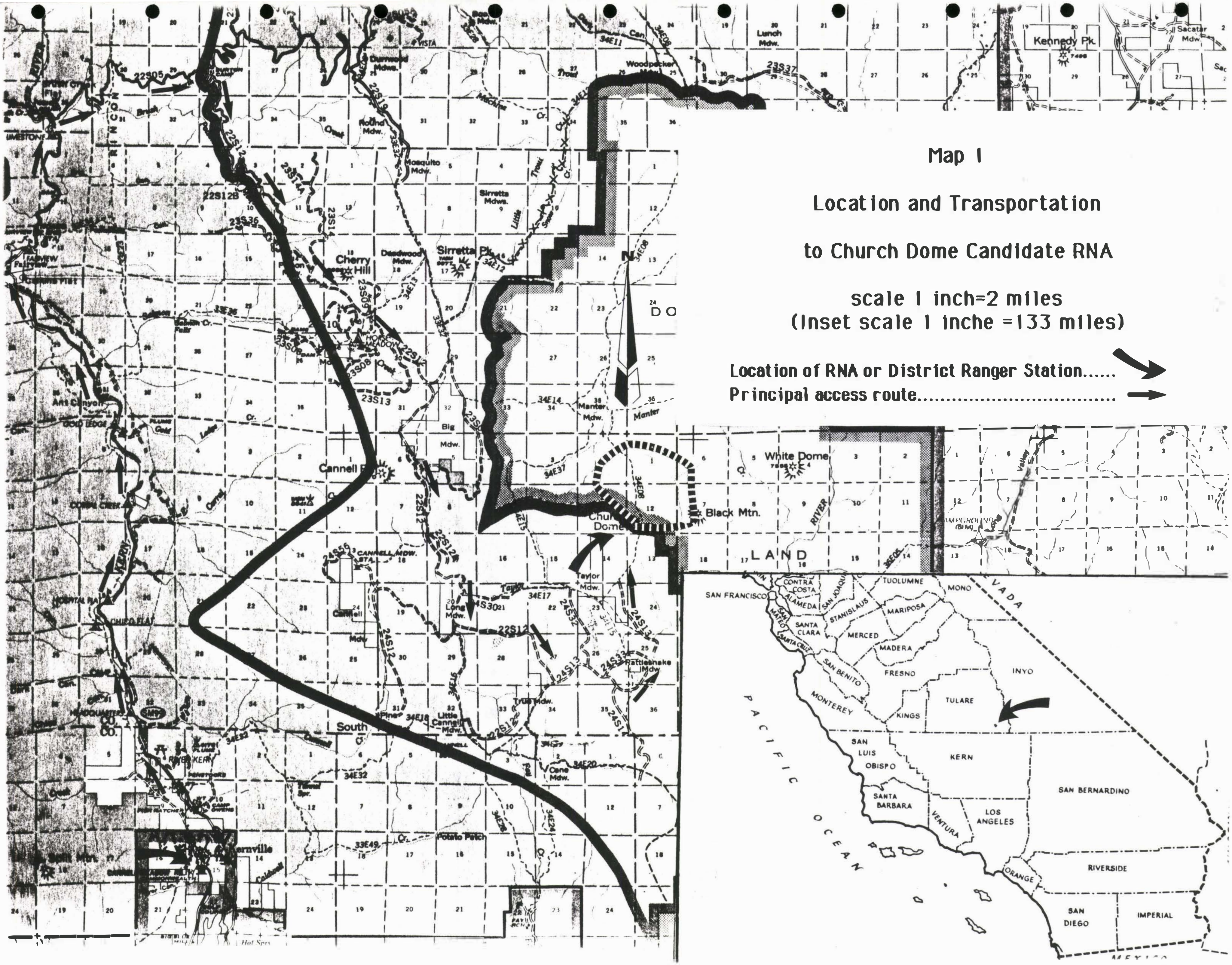
Location and Transportation

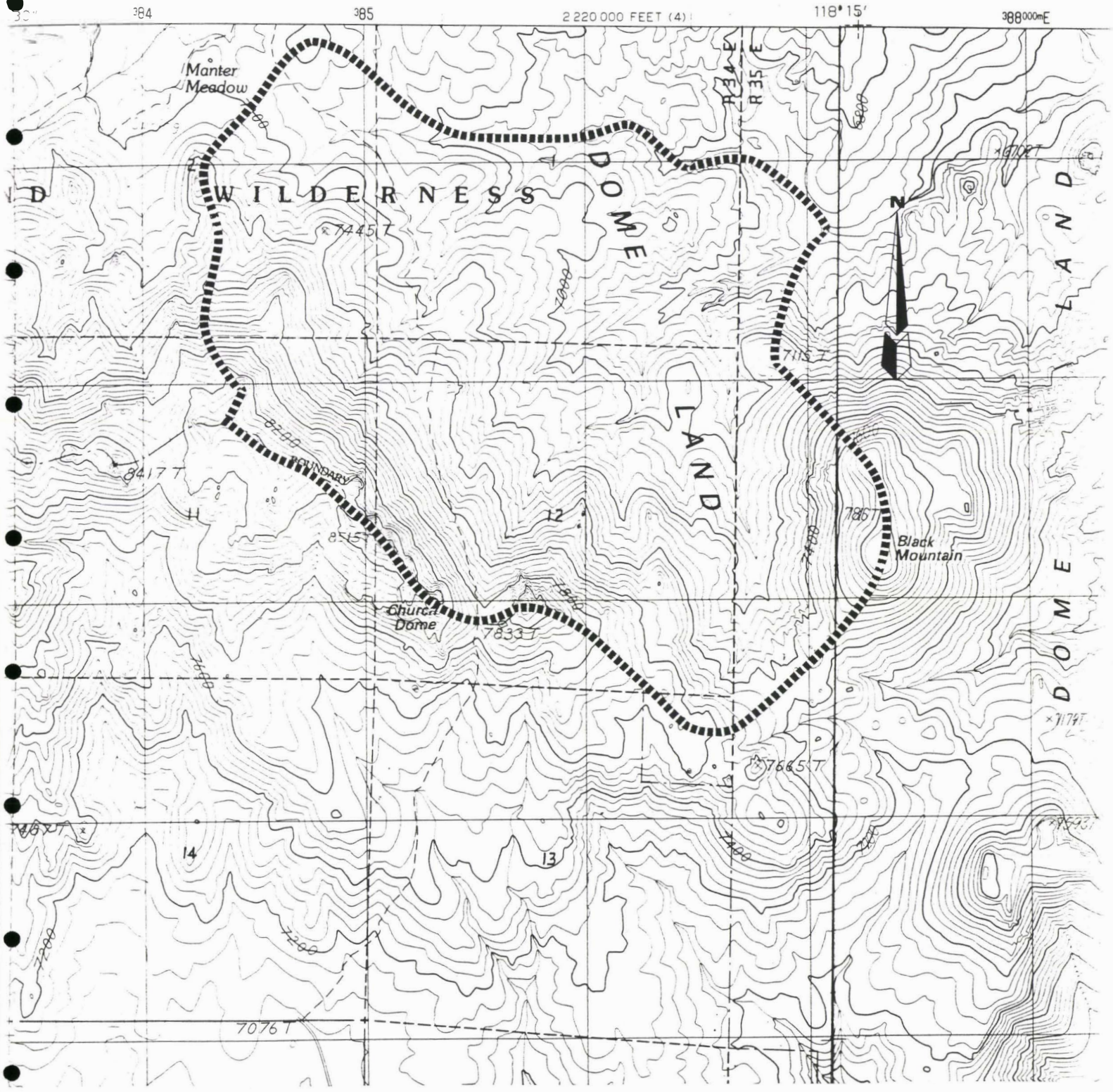
to Church Dome Candidate RNA

scale 1 inch=2 miles
(Inset scale 1 inche =133 miles)

Location of RNA or District Ranger Station......

Principal access route......................................

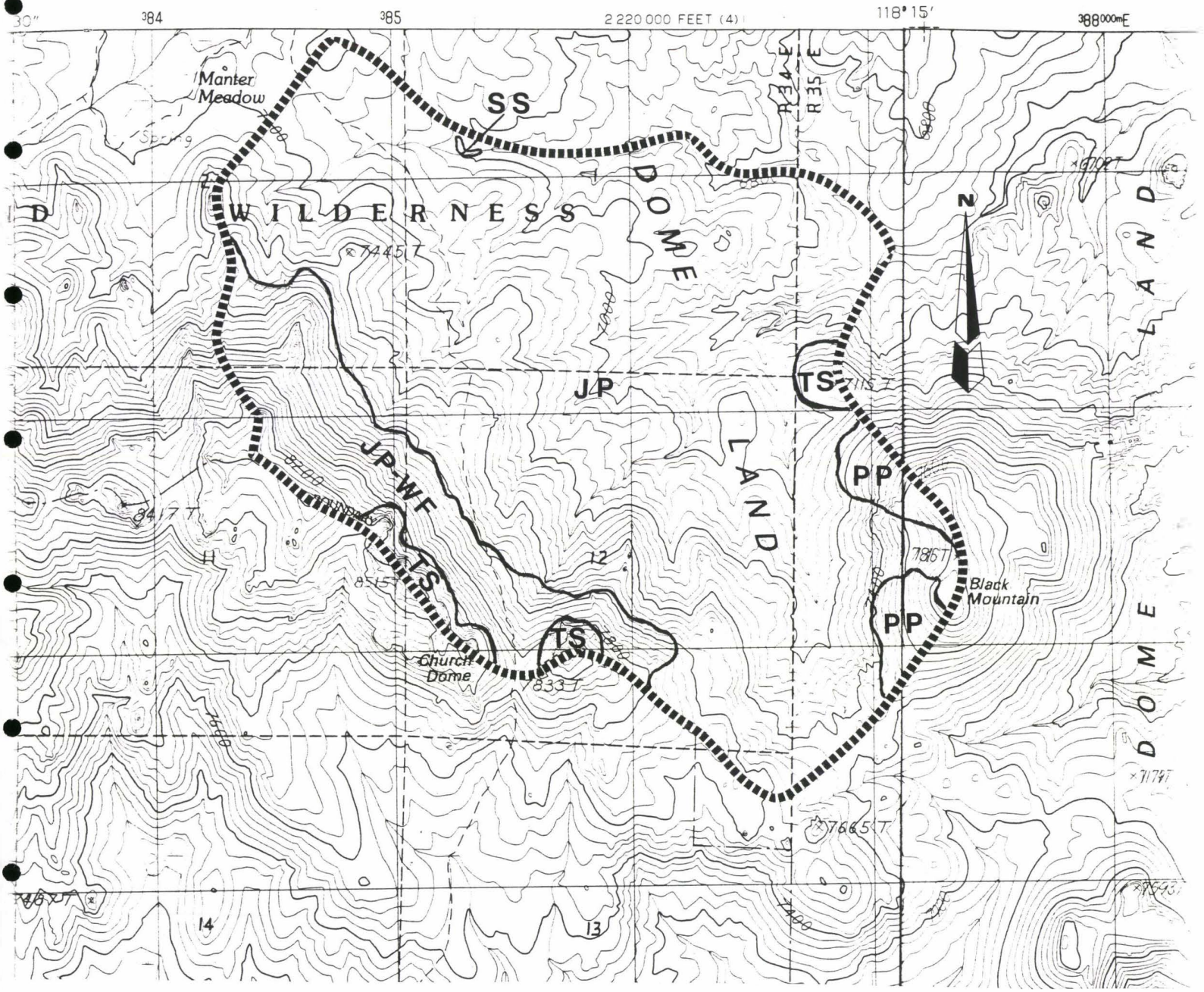




Map 2

The Proposed Church Dome RNA

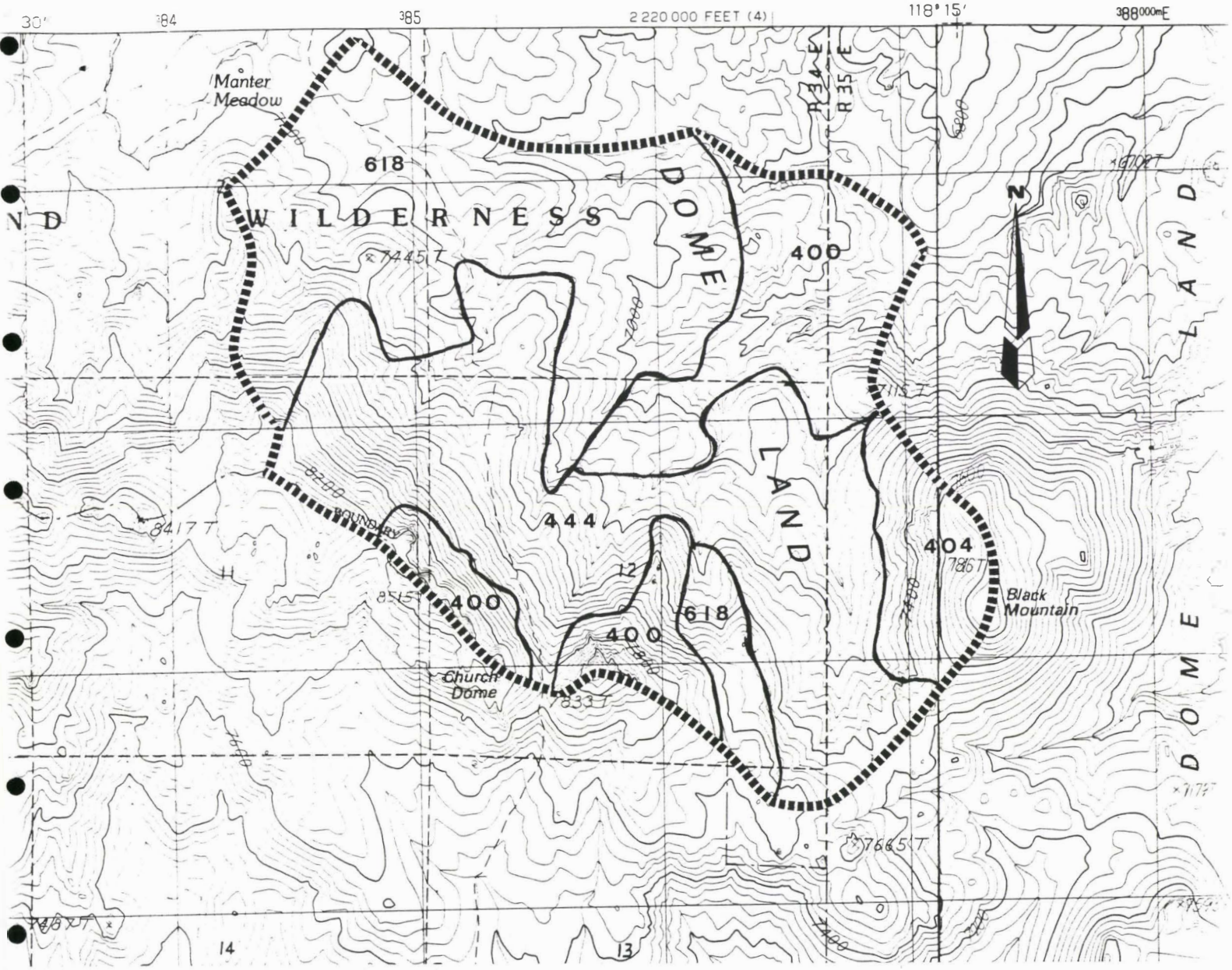
scale 1:24,000
(2.64 inches=1 mile)



Map 3

Vegetation Map of the Proposed Church Dome RNA

map symbol:	vegetation type:
JP	Jeffrey pine Forest
JP-WF	Jeffrey pine-white fir
PP	Pinyon pine forest
T-S	Talus and Scree
SS	Spring and streambed



Map 4
Soil Units of the Proposed Church Dome RNA

map symbol:	Map unit name:
400	Rock outcrop
404	lithic xerothents-Rock outcrop
444	rock outcrop-Brader-Siskiyou families
618	Chaix-Chawanakee-Rock outcrop

Figure 1

Figure 2

Figure 3

Figure 4

Figure 5

Figure 6

Fig. 7

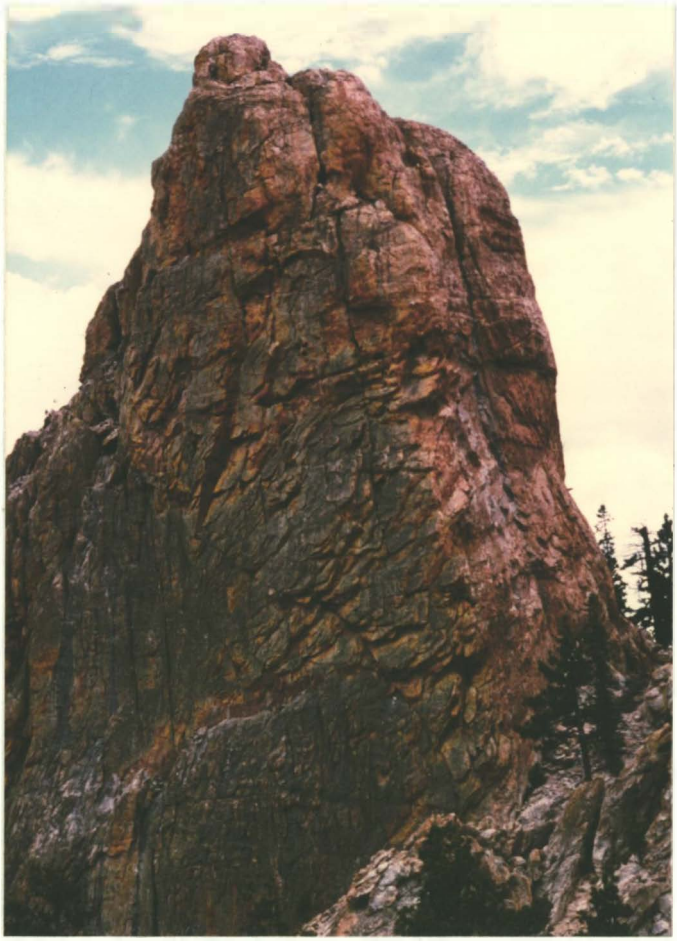


Fig. 8

Fig. 9

Fig. 10